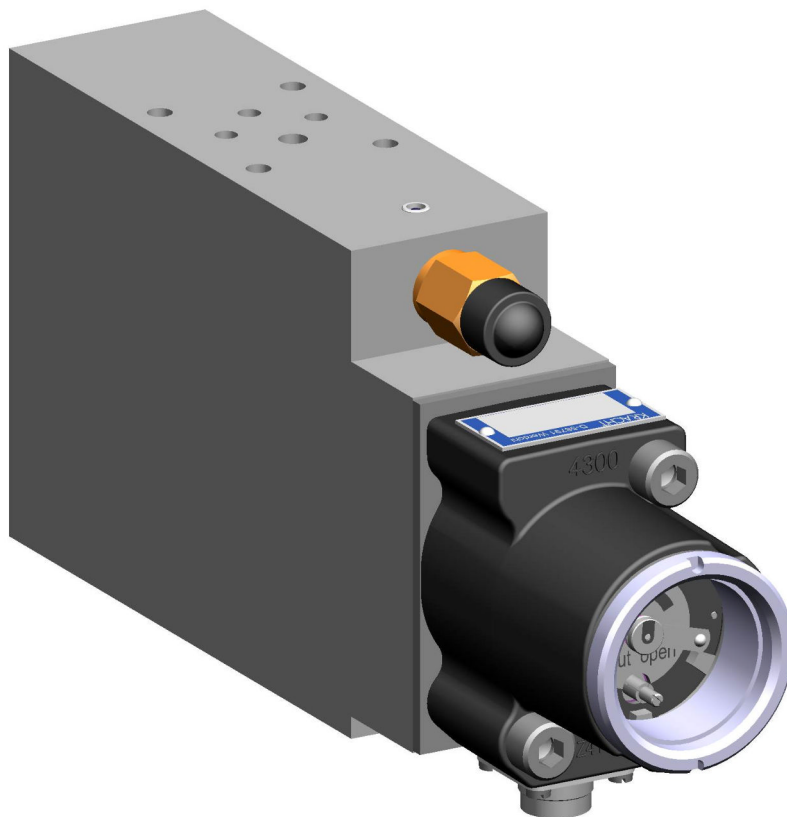


D.0030390002

Operating instructions (Translation)



VOLUMEK Valve Position Indicator 02/04

88030390002-03

Englisch

2022-07-08

KRACHT

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1 General

1.1 About the documentation

These operating instructions describe the installation, operation and maintenance of the following device:

VOLUME Valve Position Indicator 02/04

The device is manufactured in different versions. Information about the version concerned in the individual case can be found on the device's type plate.

The structure of the type designation and a more detailed description of the individual series and nominal sizes can be found in the [chapter 3 “Device description”](#) and in the [chapter 4 “Technical data”](#).

If you have any questions about this operating manual, please contact the manufacturer.

1.2 Manufacturer's address

KRACHT GmbH
Gewerbestraße 20
DE 58791 Werdohl
phone: +49 2392 935-0
fax: +49 2392 935-209
email: info@kracht.eu
web: www.kracht.eu

1.3 Intended use

1. The device is used to measure and display the displacement distance of hydraulic activated ship fittings for ballast, cargo or stripping systems. The position of the fitting is measured and optically displayed on the device and output as an analogue signal.
2. The display of the volumetric-recorded valve position can be read visually onsite or tapped electrically through a potentiometer and/or limit switch.
3. Comply with the permissible operating data.
4. Comply with the permissible mounting position.
5. The electronic device has been constructed according to the latest technical standard. Only use it:
 - in a perfect technical condition,

- intended use,
 - conscious of safety and danger, taking the operating instructions into account.
6. The device may only be used when it is in a proper condition.
 7. Deviations from the operating conditions require express approval by the manufacturer.
 8. Type plates or other references on the device must not be removed nor made illegible resp. unrecognisable.

2 Safety

2.1 Symbolism



Identification of an immediate hazard, which would result in death or severe bodily injury if not avoided.



Identification of a potential medium risk hazard, which would lead to death or severe bodily injury if not avoided.



Identification of a low risk hazard, which could lead to minor or medium bodily injury if not avoided.



Flagging of notices to prevent property damage.



Identification of basic safety instructions. Non-compliance can lead to hazards for people and the device.



Flagging of special user tips and other especially useful or important information.

2.2 Personnel qualification and training

The staff designated to assemble, operate and service the device must be properly qualified. This can be through training or specific instruction. Personnel must be familiar with the contents of this operating instructions.



Read the operating instructions thoroughly before use.

2.3 Basic safety instructions



1. Comply with existing regulations on accident prevention and safety at work along with any possible internal operator regulations.
2. Pay attention to the greatest possible cleanliness.
3. Wear suitable personal protection equipment.
4. Do not remove, make illegible or obliterate type plates or other references on the device.
5. Do not make any technical changes on the device.
6. Maintain and clean the device regularly.
7. Use spare parts approved by the manufacturer only.

2.4 Warning



Malfunction!

Risk of injury due to operating mistakes or failure of the unit when controlling plants or process sequences.

1. Suitable safety precautions must be taken when the device is used.
2. In case of a fault or change of the operating behaviour, put the unit out of service.



Exposed electrical components!

Danger of death due to electric shock.

1. Follow the special safety regulations during all work on electrical installations.
2. Only allow electricians to work on electrical systems.
3. Only use connection lines that are resistant to ambient influences and media.



Danger through changes!

In the case of changes (including operating behaviour) that can impair safety, the device can be damaged or functional problems can lead to accidents with serious injuries or death.

1. Switch the device off immediately in the case of any changes.

 **WARNING**

Hazard due to pressurized parts

Danger of injury from spurting fluids.

1. Depressurize the connection lines and keep the connection lines depressurised during all work on the device.
2. Wear suitable protective equipment.

 **WARNING**

Failure of load-carrying parts due to overload!

Danger of injury from flying parts.

Danger of injury from spurting fluids.

1. Use only connections and lines approved for the expected pressure range.
2. Securely prevent exceeding the permissible pressure, e.g. by using pressure relief valves or rupture discs.
3. Design pipework so that no tensions, e.g. caused by changes in length due to fluctuations in temperature, are transmitted to the device.

 **CAUTION**

Hot surfaces!

Burn injury to skin if touched.

1. Take measures against accidental touching of hot surfaces (> 60 °C).

 **CAUTION**

Hot surfaces!

Burn injury to skin if touched.

1. At temperatures $\geq 48^{\circ}\text{C}$ the device must be allowed to cool down first.

3 Device description

3.1 Basic construction and function

The device is operated together with a type VCM volumetric meter and by type HB 4 hydraulic block.

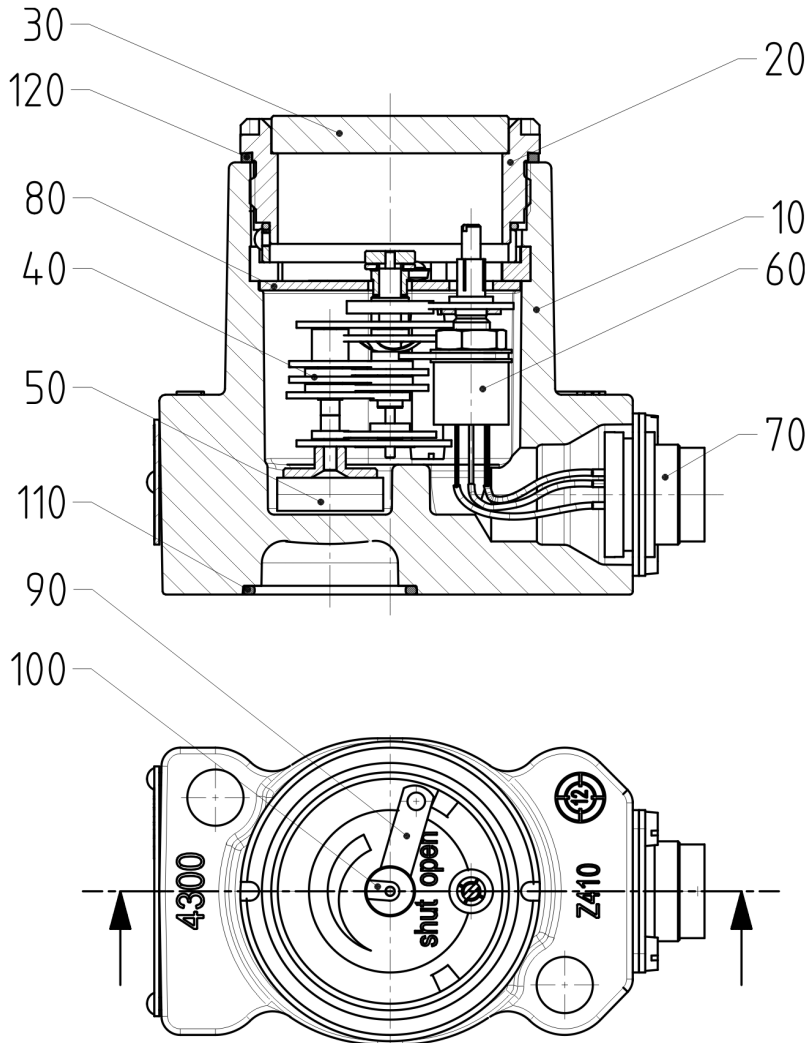
The VCM hydraulically records the movement of an actuator and transmits it using a permanent-magnetic coupling to the device gearbox. The gear ratio is designed for a dial train of 180° so it is adapted to the volume that is displaced during the actuator movement of one final position into the other.

The output axle of the magnetic coupling is additionally provided with an indicator, which makes the rotary movement of the VCM visible. The display device is completely isolated from the hydraulic circuit.

The actuator is moved hydraulically through Valve block HB 4, which has to be completed with a directional valve and mounted on a connecting plate. The HB 4 includes a shock valve for pressure safeguarding and an anti-cavitation valve, which is needed during temperature fluctuations. In addition, the HB 4 is provided with a flow-control screw which dampens the volumetric-flow peaks, which can occur when switching the valve.

3.2 Basic design

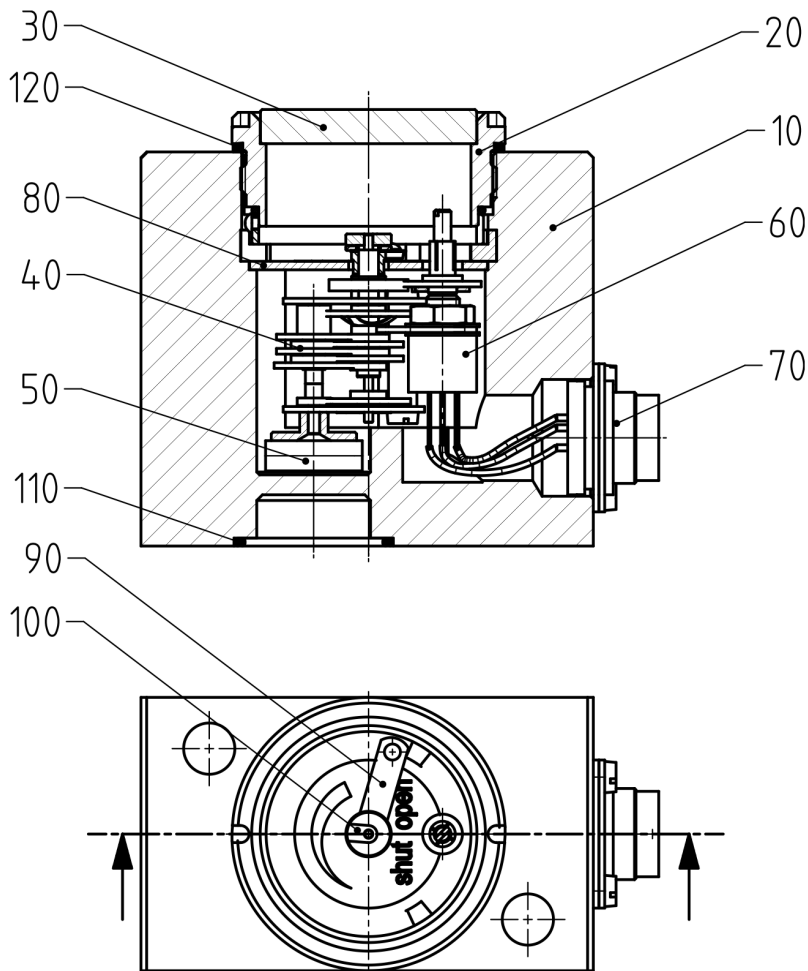
3.2.1 Indicator AVC 02.1



Description

- | | |
|---------------------|-----------------------|
| 10. Gear housing | 70. Male socket |
| 20. Cover | 80. Contact plate |
| 30. Indicator glass | 90. Contact pointer |
| 40. Measuring gear | 100. Indicator signal |
| 50. Magnet | 110. O-Ring |
| 60. Potentiometer | 120. Seal |

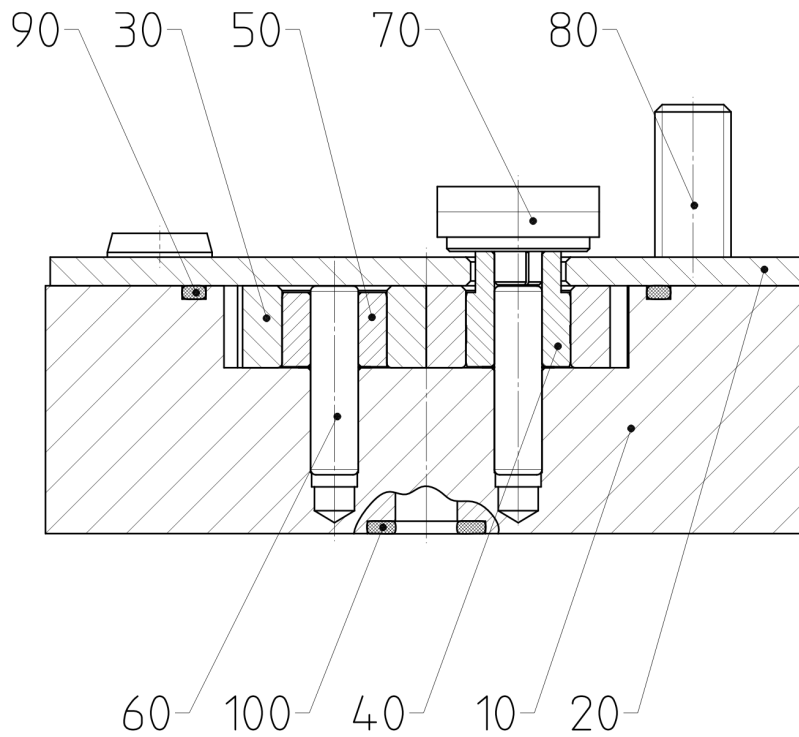
3.2.2 Indicator AVC 02.4



Description

- | | |
|---------------------|-----------------------|
| 10. Gear housing | 70. Male socket |
| 20. Cover | 80. Contact plate |
| 30. Indicator glass | 90. Contact pointer |
| 40. Measuring gear | 100. Indicator signal |
| 50. Magnet | 110. O-Ring |
| 60. Potentiometer | 120. Seal |

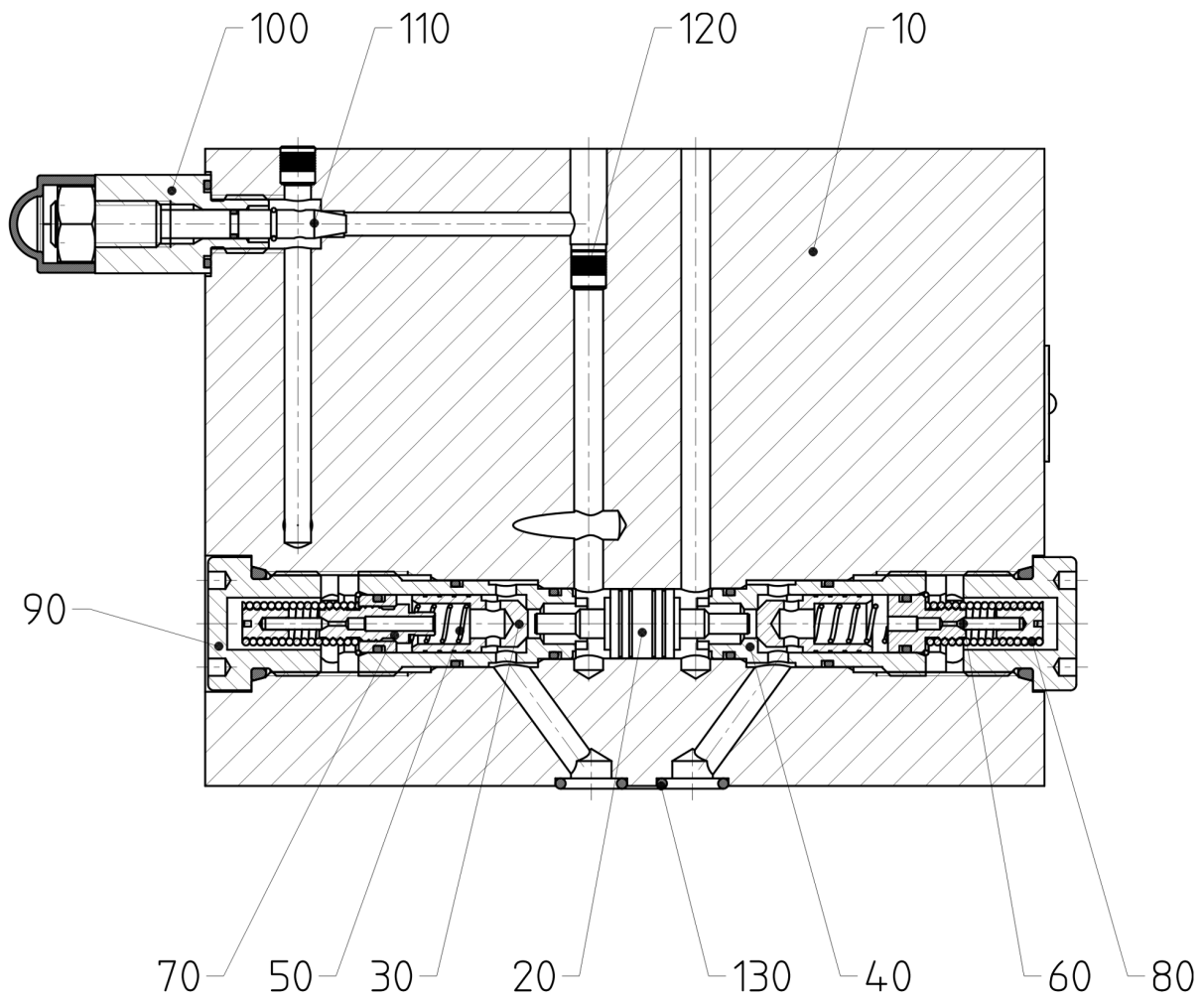
3.2.3 VCM



Description

- | | |
|------------------------|---------------------------|
| 10. Housing | 60. Bearing pin |
| 20. Cover | 70. Magnet |
| 30. Gear | 80. Socket head cap screw |
| 40. Plain bearing bush | 90. O-Ring |
| 50. Plain bearing bush | 100. O-Ring |

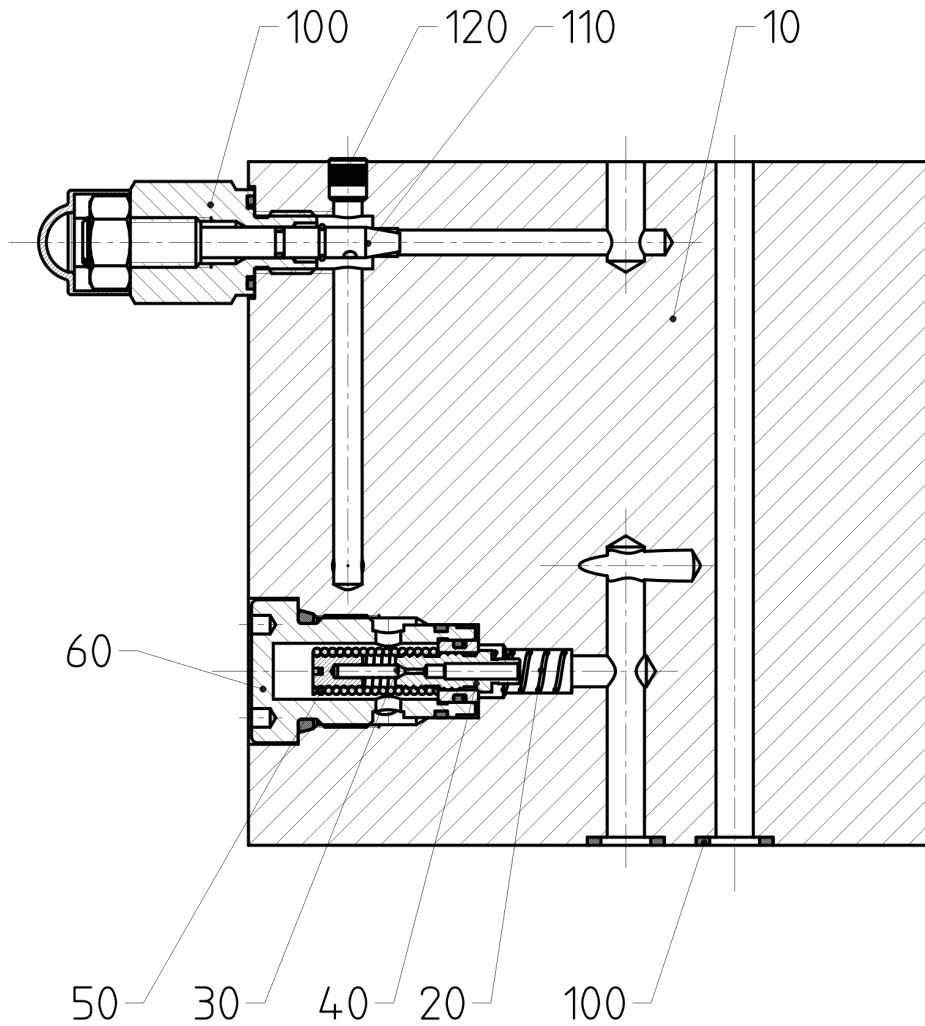
3.2.4 HB 4.0311.



Description

- | | |
|---------------------------|-------------------------|
| 10. Housing | 80. Draw spring |
| 20. Change-over piston | 90. Screw plug |
| 30. Valve cone | 100. Flow restrictor |
| 40. Guide sleeve | 110. Flow-control screw |
| 50. Compression spring | 120. Expander plugs |
| 60. Excess-pressure valve | 130. O-Ring |
| 70. Anti-cavitation valve | |

3.2.5 HB 4.0324.



Description

- | | |
|---------------------------|------------------------|
| 10. Housing | 60. Screw plug |
| 20. Compression spring | 70. Flow restrictor |
| 30. Excess-pressure valve | 80. Flow-control screw |
| 40. Anti-cavitation valve | 90. Expander plugs |
| 50. Draw spring | 100. O-Ring |

3.3 Type key

3.3.1 Indicator AVC

Ordering example												
AVC		02		A		1		O		1		U...:1
1.		2.		3.		4.		5.		6.		7.

Explanation of type key			
1.	Product name		
2.	Nominal size		
	02	for VCM 02 and VCM 04	
3.	Indicator type		
	A	Optical display without elektrik	B Optical display With limit switch
	CL	Optical display Conductive plastic potentiometer	DL Optical display Conductive plastic potentiometer and limit switch
4.	Construction type		
	1	AlMgSi (Standard)	4 Brass CW710R / 2.0540 (seawater resistant)
5.	Electrical connection		
	O	without elektrik	A Attaching plug Series 723 5-pin (Standard)
	B	Attaching plug DIN EN 175301-803 (old DIN 43650)	E KEMA-acceptance
6.	Design serial number (specified by manufacturer)		
7.	Transmission gears e.g. U 98.3:1 (will be selected by KRACHT)		

3.3.2 Volume counter VCM

Ordering example												
VCM		02		N		1		P		1		S
1.		2.		3.		4.		5.		6.		7.

Explanation of type key												
1.	Product name											
2.	Nominal size											
	02											
	04											
3.	Seal											
	N	NBR					F	FKM				
4.	Construction type											
	1	EN-GJL-250 / AL					2	Brass CW710R/2.0540 AL ENAW-6082 (seawater resistant)				
5.	Type of connection											
	P	Plate structure										
6.	Design serial number (specified by manufacturer)											
7.	Function											
	S	Standard					R	With notch				

3.3.3 Valve block HB 4

Ordering example									
HB 4		A		0311		A		.	.
1.		2.		3.		4.		5.	6.

Explanation of type key				
1.	Product name			
2.	Construction type			
3.	Function			
	0311 0324			
4.	Design serial number (specified by manufacturer)			
5.	Temperature-specific pressure limitation			
	110	$p_{\max} = 110 \text{ bar}$	240	$p_{\max} = 240 \text{ bar}$
	180	$p_{\max} = 180 \text{ bar}$		
6.	Seal			
	No specification	NBR	FKM	FKM

3.4 Function diagram



Hydraulic schematic

The dimensions of the hydraulic schematic can be found in the relevant technical data sheets.

4 Technical data

4.1 General information

General information VOLUME	
Hole pattern / Nominal size	ISO 4401 / DIN 24340-A6
Connection type	Connection plate (not included in the scope of delivery)
Mounting position	Any
Ambient temperature	-20°C ... +60°C

4.2 Hydraulic parameters

Hydraulic parameters VOLUME		
Geom. tooth volume	VCM 02	$V_{gz} = 0.25 \text{ cm}^3$
	VCM 04	$V_{gz} = 0.50 \text{ cm}^3$
Max. Volumetric flow	VCM 02	$\dot{V} = 4 \text{ l/min}$
	VCM 04	$\dot{V} = 7 \text{ l/min}$
Max. operating pressure	p_{max}	200 bar
Opening pressure pressure-relief valve	$p_{max,DBV}$	240 / 180 / 110 bar (see section 3.3.3 "Valve block HB 4")
Hydraulic fluids	Mineral oil according to DIN 51524/25	
Fluid temperature range	-20°C ... +80°C	
Viscosity	20 mm ² /s ... 380 mm ² /s	

4.3 Electrical parameters

Electrical data	Conductive plastic potentiometer
Connection resistance	1 k Ω
Resistance tolerance	$\pm 20\%$
Linearity	$\pm 2\%$
Max. wiper current	1 mA
Power rating	0.2 W / 55°C
Dielectric strength	500 V _{eff} / 1 min
Isolation resistance	> 1 G Ω bei 500 DVC
Resistance resolution	-
Operating temperature	-55°C ... +105°C
Climatic test class	55/150/56
Protection class	IP67
Vibrations	10 G (30...2000 Hz / 0.75 mm)
Shock	50 G (Semi-sinusoidal, 7ms)

4.3.1 KEMA-acceptance

Input circuit (connector); in type of protection intrinsic safety Ex ia IIC, only for connection to a certified intrinsically safe circuit, with the following maximum values:

Electrical data		
Voltage	U _i	30 V
Current	I _i	Any
Power	P _i	See table below
Capacitance	C _i	0 nF
Inductance	L _i	0 μ H

Ambient temperature - Power assignment						
Ambient temperature	ϑ_u [°C]	40	50	60	70	80
Power	P _i [W]	1.3	1.25	1.2	1.1	1.0



Every KEMA marked device was routine tested to withstand 500 V AC for 1 minute, between electrical parts and earth/enclosure.

CAUTION:

If the equipment is mounted in an area where EPL Ga apparatus is required, it must be installed such that even in the event of rare incidents, ignition sources due to impact and friction sparks on the connector are excluded. This is because the enclosure cover is aluminium and the connector may also contain contents of aluminium >10%.

4.4 Dimensions

Dimensions of the device can be found in the relevant technical data sheets.

5 Transport and storage

5.1 General

- After receipt, check the device for transport damages.
- If transport damage is noticed, report this immediately to the manufacturer and the carrier. The device must then be replaced or repaired.
- Dispose of packing material and used parts in accordance with the local stipulations.

6 Installation

6.1 General



WARNING

Hazard due to pressurized parts

Danger of injury from spurting fluids.

1. Depressurize the connection lines and keep the connection lines depressurised during all work on the device.
2. Wear suitable protective equipment.

6.2 Electrical connection

Compliance with the maximum permissible operating pressures of the potentiometer listed in the [section 4.3 “Electrical parameters”](#) is mandatory.

Refer to the technical data sheets for the respective contact assignment of the plug connector.



Maintain good engineering practices during assembly. In particular, follow the special safety regulations for any work on electrical installations.

This work may only be carried out by a qualified electrician.

In devices which will be used in the Ex-are, always comply with the pertinent regulations and follow the instructions!

7 Operation start-up

7.1 Safety instructions for start-up

 DANGER
<p>Hazardous fluids! Danger of death when handling hazardous fluids.</p> <ol style="list-style-type: none">1. Comply with the safety data sheets and regulations on handling hazardous fluids.2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.
 CAUTION
<p>Hot surfaces! Burn injury to skin if touched.</p> <ol style="list-style-type: none">1. Wear protective gloves at temperatures $\geq 48^{\circ}\text{C}$.

7.2 Further operation start-up

The device was tested in the factory before delivery. It can be put into operation immediately, as soon as the mechanical and electrical connections have been set up.

7.3 Permissible limits for operation

The device may only be operated within the given limit values (see [section 1.3 "Intended use"](#) and [chapter 4 "Technical data"](#))

For the ambient conditions, the limit values given in [chapter 4 "Technical data"](#) must be observed.

8 Removal

8.1 General

DANGER

Danger when dismantling the valve cap

The valve cover stands under high spring pressure. Parts flying around uncontrolled or fluids squirting out lead to accidents with severe injuries or even result in death.

1. The removal of the valve or the valve cover is not allowed.

DANGER

Hazardous fluids!

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.

CAUTION

Hot surfaces!

Burn injury to skin if touched.

1. At temperatures $\geq 48^{\circ}\text{C}$ the device must be allowed to cool down first.

WARNING

Hazard due to pressurized parts

Danger of injury from spurting fluids.

1. Depressurize the connection lines and keep the connection lines depressurised during all work on the device.
2. Wear suitable protective equipment.

8.2 Removing the device

DANGER

Exposed electrical components!

Danger of death due to electric shock.

1. Follow the special safety regulations during all work on electrical installations.
2. Only allow electricians to work on electrical systems.
3. Only use connection lines that are resistant to ambient influences and media.

DANGER

Hazardous fluids!

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.

WARNING

Hazard due to pressurized parts

Danger of injury from spurting fluids.

1. Depressurize the connection lines and keep the connection lines depressurised during all work on the device.
2. Wear suitable protective equipment.

CAUTION

Hot surfaces!

Burn injury to skin if touched.

1. At temperatures $\geq 48^{\circ}\text{C}$ the device must be allowed to cool down first.
- It must be guaranteed that the connection pipes have been made pressure-less and the electrical connection is voltage-free.
 - Loosen the attachment screw on the plug.
 - Pull the plug off the housing.
 - Loosen the pipe connections from the housing or take the housing off the fixture.

9 Technical data

The technical data of the device can be found in the order-related documents.

9.1 General



NOTICE

Property damage and malfunctions

If the device is not regularly maintained, damage that is not discovered or not repaired can lead to malfunctions and to the failure of the device.

1. Maintain and clean the device regularly.
2. Check the device initially right after commissioning.
3. Adapt the extent and time between maintenance intervals to the demands posed by the location.
4. Watch out for any possible damages during the visual inspection.
5. The device must not be used if damages are found.
6. Document the type and extent of the maintenance and the measured values. That allows the fastest possible detection of a change in operating performance.

When designed to the conditions of use and fitted correctly, the devices are able to be used for long and problem-free operation. They only require a little maintenance. This is absolutely essential for problem-free operation, however. Experience shows that a high percentage of the problems and damage that occur can be traced back to dirt and lack of maintenance.

The device is basically maintenance-free. If, however, fluids are pumped that can lead to deposits in the measuring device, the device may need cleaning.

Otherwise the device can be cleaned within the context of normal system cleaning. A change in measuring accuracy can be an indication of wear. We recommend checking this regularly.

The extent and the time intervals for inspections and maintenance are dependent on the local conditions.



Barriers and instructions

All barriers and warning signs removed during this must be attached to their original position on completing maintenance and/or repairs.



Checking and documentation of the operating data

Regular checking and documentation of all operating data such as pressure, temperature, current consumption, degree of filter soiling, etc. contributes to early problem detection.

 **DANGER****Device can burst if pressure is too high!**

Parts flying around uncontrolled or squirting fluids can lead to accidents with severe injuries or even lead to death.

1. Use only connections and lines approved for the expected pressure range.
2. Immediately replace damaged components.

 **DANGER****Hazardous fluids!**

Danger of death when handling hazardous fluids.

1. Comply with the safety data sheets and regulations on handling hazardous fluids.
2. Collect and dispose of hazardous fluids so that no hazards arise for people or the environment.

 **DANGER****Exposed electrical components!**

Danger of death due to electric shock.

1. Follow the special safety regulations during all work on electrical installations.
2. Only allow electricians to work on electrical systems.
3. Only use connection lines that are resistant to ambient influences and media.

 **CAUTION****Hot surfaces!**

Burn injury to skin if touched.

1. At temperatures $\geq 48^{\circ}\text{C}$ the device must be allowed to cool down first.

9.2 Unusual noise

Some damage is indicated by unusual noises. If there is a change in the device's operating noise, a thorough examination of the cause must always take place.

9.3 Static seals

The static seals on the device's separation joints and the connection lines must be periodically checked for leakproofness.

If there are any visible leaks, immediately stop plant operation.

If the leaks cannot be stopped by simply retightening the connection, replace all affected seals.

9.4 Screw joints

All the screw joints must be checked at regular intervals to make sure they are tight fit. Loose screw joints must be tightened and, if necessary, secured against loosening by e.g. Loctite (medium strength).

9.5 Surface temperature

The temperatures at the device surface can be checked to prevent premature wear or detect device overload. This temperatures should never be much higher than the media temperature at the device inlet. If the temperature on the device surface is much higher, this is an indication of a device malfunction. In this case the device must be replaced immediately.

10 Repairs

10.1 General

The repairs covers:

1. Troubleshooting
Determination of damage, pinpointing and localisation of the damage cause.
2. Elimination of damage
Elimination of the primary causes and replacement or repair of defective components. The repair is generally made by the manufacturer.

Repairs by manufacturer

- Before returning the device, fill in the *return notification* form. The form can be filled in online and is available as a pdf file download.



Device contains hazardous material

If the device was operated with dangerous liquids, it must be cleaned before the return. If this should not be possible, the safety data sheet of the hazardous material is to be provided beforehand.

Repair by equipment builder/operator

If corresponding expertise and sufficient equipment is available, the equipment builder/operator can also make the repairs. Please consult the manufacturer about this.

- If required, request spare parts lists and assembly drawings from the manufacturer.
- Use spare parts approved by the manufacturer only.
- Dispose of packing material and used parts in accordance with the local stipulations.



Warranty

In case of improper implementation, any warranty is voided.



Barriers and instructions

All barriers and warning signs removed during this must be attached to their original position on completing maintenance and/or repairs.

10.2 Troubleshooting

Leaks are the most frequent problem. If these occur on the pipelines, they can be eliminated by straightforward tightening of the screw joints.

10.3 Elimination of damage

Repair damage onsite, predominantly by replacing the defective device. The device itself is generally repaired by the manufacturer.

If corresponding expertise and sufficient equipment is available, the equipment builder/operator can also make the repairs. If required, request spare parts lists and assembly drawings from the manufacturer.



NOTICE

Property damage and malfunctions

A lack of cleanliness and improper work can lead to damages and malfunctions in the device and other parts of the plant. That also applies to the use of non-original spare parts.

1. Permit only expert and technically qualified personnel to work on the device.
2. Use only genuine original spare parts.

10.4 Return

If the device has to be repaired or checked over the manufacturer's permits, it must be packed suitably for transport. In addition, a safety data sheet for the medium used must be enclosed with the device. In case of well-known mineral oils, at least the exact type description is required.

If hardening or agglutinative media are involved, the device must be cleaned before it is returned.

Cleaning is also necessary if the device has been operated with hazardous fluids.

Any openings must be closed.

10.5 Disposal

Dispose of packing material and used parts in accordance with the local stipulations.

10.6 Detecting and eliminating failures

If the device does not function properly, the electrical components should be checked first. The measuring device must remain in operation for this.



Exposed electrical components!

Danger of death due to electric shock.

1. Follow the special safety regulations during all work on electrical installations.
2. Only allow electricians to work on electrical systems.
3. Only use connection lines that are resistant to ambient influences and media.

If there is no analytical evaluation software available, the following troubleshooting table is to be used for problem analysis.

Failure	Potential causes	Possible measures
Leakage display (indicator) rotates even though the actuator is in the "shut" or "open" end position	Internal leaks	Have the unit repaired or replaced by the manufacturer.
Contact pointer does not move even though the actuator was adjusted	Gear friction coupling responds	Have manufacturer readjust the friction coupling
	Max. permissible volume flow was exceeded (Possibly also only intermittent)	Lengthen the actuator switch actuation period and/or use damping nozzles
No limit switch signal even though the actuator is in the "shut" or "open" limit position	No contact made between the contact needle and the contact plate (Dial not in end position)	Check the design data for the gear transmission; if applicable have the manufacturer make a new gear design
	No contact made between the contact needle and the contact plate (Pointer in end position)	Have the unit repaired or replaced by the manufacturer.
No potentiometer signal	Potentiometer defective	Have the unit repaired or replaced by the manufacturer.
	Plug connector defective	Check plug connector
	Cable break	Repair cable defect
Leaks, media escaping	O-ring in the housing not airtight.	Check the material compatibility
Decrease in measuring accuracy	Wear	Send the unit to the manufacturer for inspection

11 Appendix

Declaration

for equipment without potential ignition source in reference to the Directive 2014/34/EU

KRACHT GmbH hereby declares that the following equipment is:

Designation: Switches and/or potentiometers in the Volumec Indicating device.

acc. to Directive 2014/34/EU, article 1 para 2 and 3

- a) no safety and control equipment,
- b) no devices,
- c) no protective systems and
- d) no components.

The switches and/or potentiometers are used as "simple apparatus" potential-free in intrinsically safe circuits; at a max. operating temperature of 60 °C, the power P_i fed in must not exceed a value of 1.2 watts. The switches and/or potentiometers have no potential ignition source of their own and no internal explosive atmosphere when operated as intended. They are not marked in accordance with the ATEX directive. An internal ignition hazard assessment has been carried out.

The equipment may be employed as follows, taking the current installation regulations for equipments and installations in the Ex range, e.g. EN 60079-14, into account:

- a) In zone 2 (gas-ex, category 3G) in the explosion groups IIA, IIB and IIC
- b) In zone 1 (gas-Ex, category 2G) in the explosion groups IIA, IIB and IIC

The qualification pertaining to the surface temperature is T4. The equipment is no ignition source for all gases, vapors, liquid aerosols having an ignition temperature $>135^{\circ}\text{C}$.

The following harmonized standards/specifications have been applied in their current version valid at the date of signature.

EN 1127-1:2011: Explosive atmospheres – Explosion prevention and protection - Part 1: Basic concepts and methodology

DIN EN 60079-11 VDE 0170-7: Explosive atmospheres – Part 11 Equipment protection by intrinsic safety

Further important notes:

- The maximum surface temperatures depend on the installation situation and are the responsibility of the customer or operator. The limit values of temperature class T4 cannot be reached by the intended operation.
- All external materials are made of suitable low-sparking materials. However, the operator is responsible for checking the risk of ignition by sparks during operation of the complete machine. Light metal parts are to be installed protected against external impact energy.
- The listed components are suitable for ambient temperatures of -20°C ... $+60^{\circ}\text{C}$. The temperature class is complied with.
- At an ambient temperature of $+60^{\circ}\text{C}$, the power P_i of the feeding circuit must not exceed 1.2 watts.
- The switches and/or potentiometers must not assume any safety functions with regard to explosion hazards.
- Newly developing ignition hazards must be taken into account by the customer or operator.
- The switches and/or potentiometers must be included in the equipotential bonding. Cathodic corrosion protection is not permitted.

Werdohl, 09.02.2022



Signed for and on behalf of KRACHT GmbH
Holger Kirsebauer
Development and Design Manager